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Bescheinigung

Certificate

Attestation

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The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

99109065.5

## PRIORITY DOCUMENT

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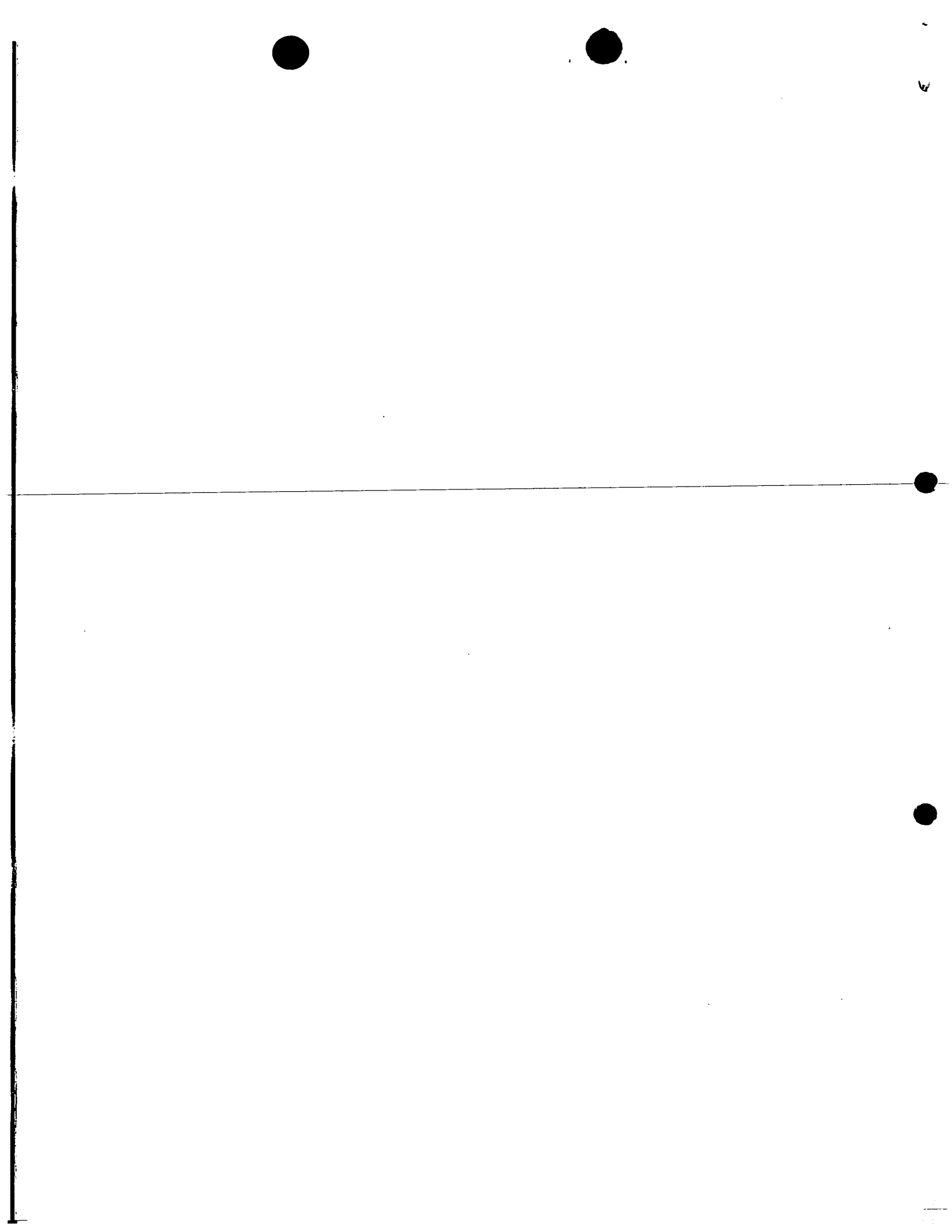
Der Präsident des Europäischen Patentamts;  
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For the President of the European Patent Office

Le Président de l'Office européen des brevets  
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I.L.C. HATTEN-HECKMAN

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**Blatt 2 der Bescheinigung**  
**Sheet 2 of the certificate**  
**Page 2 de l'attestation**

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Title of the invention:  
Titre de l'invention:  
Method for marking digital data

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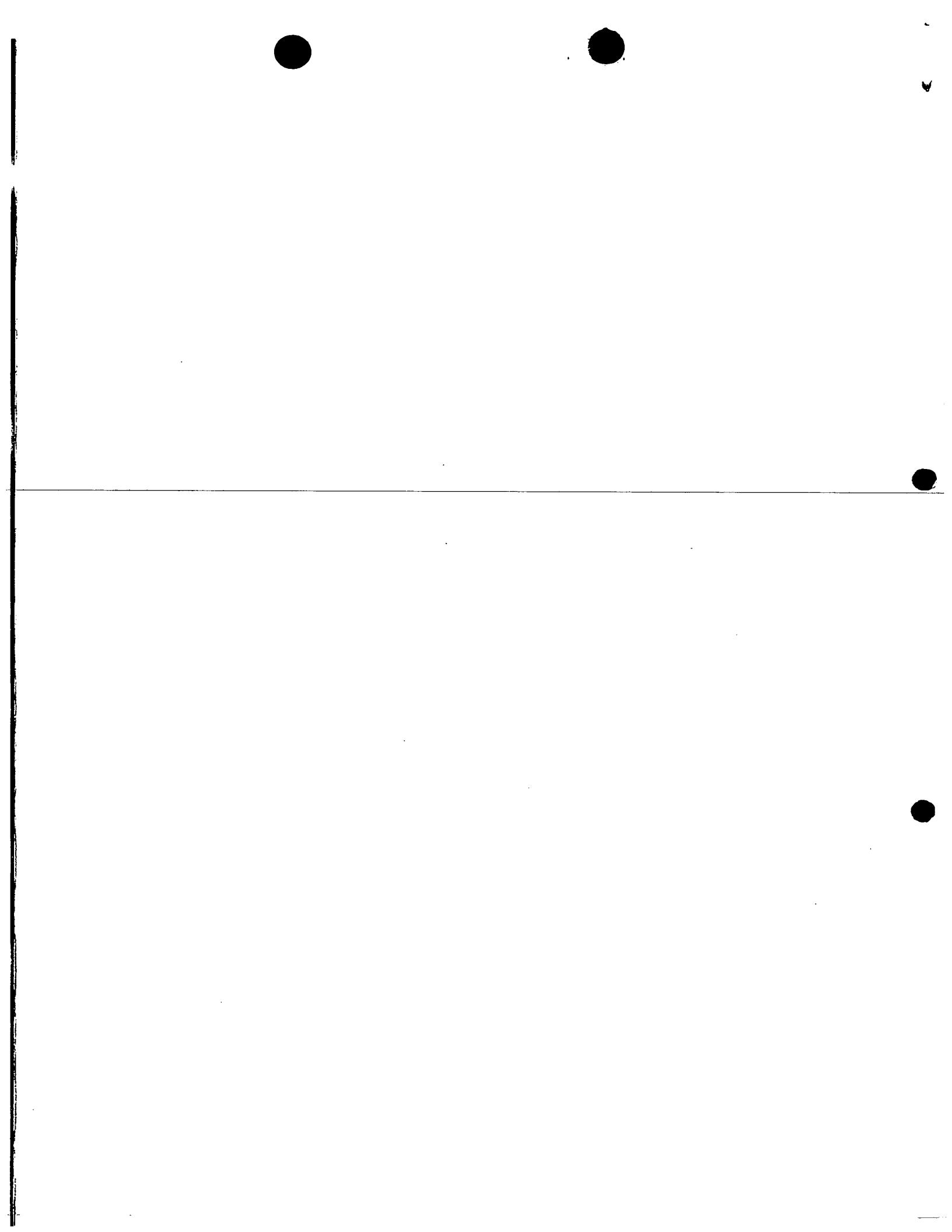
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Method for marking digital data.

The invention relates to a method for marking data of a digital data stream representing video or audio information.

5

Background

In bitstream recording one is free to subdivide the bitstream into sub-units of more regular structure. Presentation data in DVDs (digital video or versatile disc) is organised into units called Video Object Unit, denoted VOBUs, e.g. in the DVD Specifications for Video Recording. VOBUs have a variable size (data amount measured in number of sectors), but have also a variable duration (measured in number of video fields).

For data retrieval from the disc the DVD Specifications for Video Recording foresees a 'VOBU map' which is a table where for every VOBUs in a recording the length in sectors and the duration in fields is entered.

Invention

It is one object of the invention to disclose a method for marking digital data as being temporarily erased in such a way, that on the fly permanent erasure can be achieved without any additional view into the streams.

According to the invention, this object is achieved by means of the features specified in main claims. Advantageous designs and developments are specified in subclaims.

The directory and file structure of DVD Stream Recording is organized in Stream Data and Navigation Data of the DVD Stream Recording as follows:

Any DVD Streamer Device has certain requirements to store its own, Streamer-specific navigation data on the disc. These data are solely for helping the retrieval of recorded data; they need not be understood or even be visible to any outside Application Device.

Any DVD Streamer Device needs to communicate with the Application Device it is connected to. This communication should be straightforward, and as universal as possible, so that the maximum possible range of applications - both today and future - can be connected to the Streamer. The Navigation Data to support such communication must be understandable by the Streamer as well as by the Application Device; they will be called „Common navigation data“ in the following.

The Streamer Device should offer to the connected Application Device a means for storing its own private data of any desired kind. The Streamer needs not to understand any of the content, internal structure, or meaning of this „Application-specific navigation data“.

Navigation data is provided to control the recording, playing back, and editing of any bitstreams that are recorded. In DVD Stream Recording, Navigation Data is called „Streamer Information“ (STRI). STRI consists of six kinds of information tables, namely Streamer Video Manager Information (STR\_VMGI), Stream File Information Table (SFIT), Original Program Chain Information (ORG\_PGCI), User Defined Program Chain Information (UD\_PGCI), Text Data Manager (TXT\_DT\_MG), and Application Private Data Manager (APD\_MG).

The Stream File Information Table contains the information where on the recording media the stream data are recorded. The Original PGC Information has the function of a play list, which contains all takes which were made. A take is defined as containing the information between a start and a stop

action in the sequence of recording or also called one program or the ORG\_PGC. In addition, a Stream Object (SOB) contains a full take or part of a take. With both tables the data can be retrieved for playback.

5

The User Defined PGC Information contains information, which are defined by a user.

10 In order to address more precisely a program contains one or more cells. A cell points to Stream Object Units (SOBU) and to each SOBU an Incremental Application Packet Arrival Time (IAPAT) is assigned.

15 According to the invention a temporarily erased flag is introduced in order to indicate a cell to be temporarily erased. In addition necessary time stamps are set in a special way to enable on the fly permanent erasure without any additional view into the streams or quick permanent erasure. Advantageously the temporarily erasure can be  
20 withdrawn completely also.

For a permanent erasure of temporarily erased (TE) cells an adaptation of Stream Cell Start Application Packet Arrival Time (SC\_S\_APAT) and Stream Cell End Application Packet  
25 Arrival Time (SC\_E\_APAT) is needed. In order to realize this during recording a calculation must be performed without any additional views into the stream. This will be realized by following definition of TE cells:  
The TE cell covers a part of a SOB. SC\_S\_APAT and SC\_E\_APAT  
30 of a TE cell are set in a way that only all complete SOBUs, covered by the TE cell, are marked, i.e.  
following rules define SC\_S\_APAT and SC\_E\_APAT of a TE cell. They must be completely fulfilled:

35 SC\_S\_APAT is equal to the Application Packet Arrival Time (APAT) of the first application packet of an SOBU and

if the TE cell covers the start of the SOB, then

SC\_S\_APAT is equal to the APAT of the first application packet of the first SOBU of the SOB.

In all other cases

- 5 SC\_S\_APAT is equal to or greater than the APAT of the first application packet of the TE part and

SC\_S\_APAT is as close as possible to the APAT of the first application packet of the TE part.

- 10 SC\_E\_APAT is equal to the APAT of the first application packet of an SOBU and

if the TE cell covers the end of the SOB, then

SC\_E\_APAT is equal to the APAT of the first application packet of the SOBU following immediately the last SOBU of

- 15 this SOB.

In all other cases

SC\_E\_APAT is equal to or less than the APAT of the application packet which follows immediately the last application packet of the TE part and

- 20 SC\_E\_APAT is as close as possible to the APAT of the last application packet of the TE part.

Note 1: The definition above assumes that an SOBU exists after the last SOBU of the SOB. This SOBU doesn't exist

- 25 really.

Therefore, the following rules define the APAT of the first application packet of the SOBU following immediately the last SOBU of this SOB:

this APAT is greater than the APAT of the last application packet of this SOB and

- 30 the 18 (= MTU\_SHFT) least significant bits of this APAT value are set to zero and

this APAT value is as close as possible to the last application packet of the SOB

Note 2: TE part means all application packets of an SOB which are not part of the normal cells and which are contiguous on the stream, i.e. no breaks via normal cells. The boundaries of TE parts are normal cells or SOB boundaries. Therefore, each TE part contains one TE cell.

Note 3: SC\_E\_APAT may be less than SC\_S\_APAT. The TE part contains complete SOBUs only in the case  $SC_S\_APAT < SC\_E\_APAT$ .

Note 4: For small SOBUs the SC\_S\_APAT and the SC\_E\_APAT will be set by the definition above, so that the streamer is able to recognize whether the TE part is only inside one SOBU ( $SC_S\_APAT > SC\_E\_APAT$ ) or the TE part starts in one SOBU and ends in the following SOBU ( $SC_S\_APAT = SC\_E\_APAT$ ). Only for the (normal) case, that the TE part covers complete SOBUs SC\_S\_APAT will be less than SC\_E\_APAT.

The SCI definition of the ORG\_PGCI contains a TE flag inside C\_TY (Cell Type) of its SC\_GI. This TE flag indicates whether this is an TE cell (TE flag is set) or a normal cell (TE flag is cleared).

Drawings

Embodiments of the invention are described with reference to the accompanying drawing, which show in:

Figure 1 TE and Permanent Erasure seen from SOBU level;

Exemplary embodiments

Exemplary embodiments of the invention are explained in more detail in the following description.

In figure 1 TE and Permanent Erasure seen from SOBU level is shown. In the upper part of the drawing labeled "original

program #j contains one cell #k with one SC\_E\_APAT and one SC\_E\_APAT. The cell #k contains several SOBUs from SOBU #1 to SOBU #6. To each SOBU an Incremental Application Packet Arrival Time (IAPAT) is assigned.

5

In the middle part labeled "after TE" the gray marked part of program #j is marked for example by a user or based on given parameter as being temporarily erased. The program #j contain now 3 cells from cell #k to cell #k+2. Cell #k and cell #k+2 can be played back, while on cell #k+1 an erased flag is set. Cell #k+1 contains a TE part, which was decided to be erased and a smaller TE cell, which can be used for later recording.

To cell #k a new SC\_E\_APAT and to cell #k+2 a new SC\_S\_APAT are assigned. To enable on-the-fly erasure SC\_E\_APAT SC\_S\_APAT for cell #k+1 have to be calculated by the following rules:

SC\_S\_APAT is equal to the Application Packet Arrival Time (APAT) of the first application packet of an SOBU and if the TE cell covers the start of the SOB, then SC\_S\_APAT is equal to the APAT of the first application packet of the first SOBU of the SOB.

In all other cases

SC\_S\_APAT is equal to or greater than the APAT of the first application packet of the TE part and SC\_S\_APAT is as close as possible to the APAT of the first application packet of the TE part.

SC\_E\_APAT is equal to the APAT of the first application packet of an SOBU and if the TE cell covers the end of the SOB, then SC\_E\_APAT is equal to the APAT of the first application packet of the SOBU following immediately the last SOBU of this SOB.

In all other cases

7

SC\_E\_APAT is equal to or less than the APAT of the application packet which follows immediately the last application packet of the TE part and

SC\_E\_APAT is as close as possible to the APAT of the last application packet of the TE part.

The program #j contains now 3 cells from cell #k to cell #k+2. Cell #k and cell #k+2 can be played back, while on cell #k+1 an erased flag is set.

10

In the lower part labeled "after permanent erasure" the program #j contains only two cells, that are cell #k and cell #k+1 (former cell #k+2), while the TE cell of the former cell #k+1 was erased.

15

The SOBUs of each cell #k and cell #k+1 have been renumbered and also the assigned IAPATs. As shown in this example a small area marked in gray remains in the bit stream, which can not be used for recording of further data.

20

After permanent erasure the Stream File Information, the Original PGC Information and the User Defined PGC Information are updated.

25

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1. Method for marking data of a digital data stream  
representing video or audio information

5 including the following steps:

Stream Cell Start Application Packet Arrival Time  
(SC\_S\_APAT) is equal to an Application Packet Arrival  
Time (APAT) of the first application packet of a Stream  
Object Unit (SOBU) and

10 if the temporarily erased cell (cell #k+1) covers the  
start of the Stream Object (SOB), then

Stream Cell Start Application Packet Arrival Time

(SC\_S\_APAT) is equal to the Application Packet Arrival  
Time (APAT) of the first application packet of the first  
15 Stream Object Unit (SOBU) of the Stream Object (SOB);

if the temporarily erased cell (cell #k+1) does not  
cover the start of the Stream Object (SOB), then Stream  
Cell Start Application Packet Arrival Time (SC\_S\_APAT)

20 is equal to or greater than the Application Packet  
Arrival Time (APAT) of first application packet of the  
temporarily erased cell (cell #k+1) and

Stream Cell Start Application Packet Arrival Time  
(SC\_S\_APAT) is as close as possible to the Application  
Packet Arrival Time (APAT) of the first application  
25 packet of the temporarily erased cell (cell #k+1);

Stream Cell End Application Packet Arrival Time  
(SC\_E\_APAT) is equal to the Application Packet Arrival  
Time (APAT) of the first application packet of a Stream  
Object Unit (SOBU) and

30 if the temporarily erased cell (cell #k+1) covers the  
end of the Stream Object (SOB), then

Stream Cell End Application Packet Arrival Time

(SC\_E\_APAT) is equal to the Application Packet Arrival  
Time (APAT) of the first application packet of the

35 Stream Object Unit (SOBU) following immediately the last  
Stream Object Unit (SOBU) of this Stream Object (SOB);

if the temporarily erased cell (cell #k+1) does not  
cover the end of the Stream Object (SOE), then  
Stream Cell End Application Packet Arrival Time  
(SC\_E\_APAT) is equal to or less than the Application  
5 Packet Arrival Time (APAT) of the application packet  
which follows immediately the last application packet of  
the temporarily erased cell (cell #k+1) and  
Stream Cell End Application Packet Arrival Time  
(SC\_E\_APAT) is as close as possible to the Application  
10 Packet Arrival Time (APAT) of the last application  
packet of the temporarily erased cell (cell #k+1).

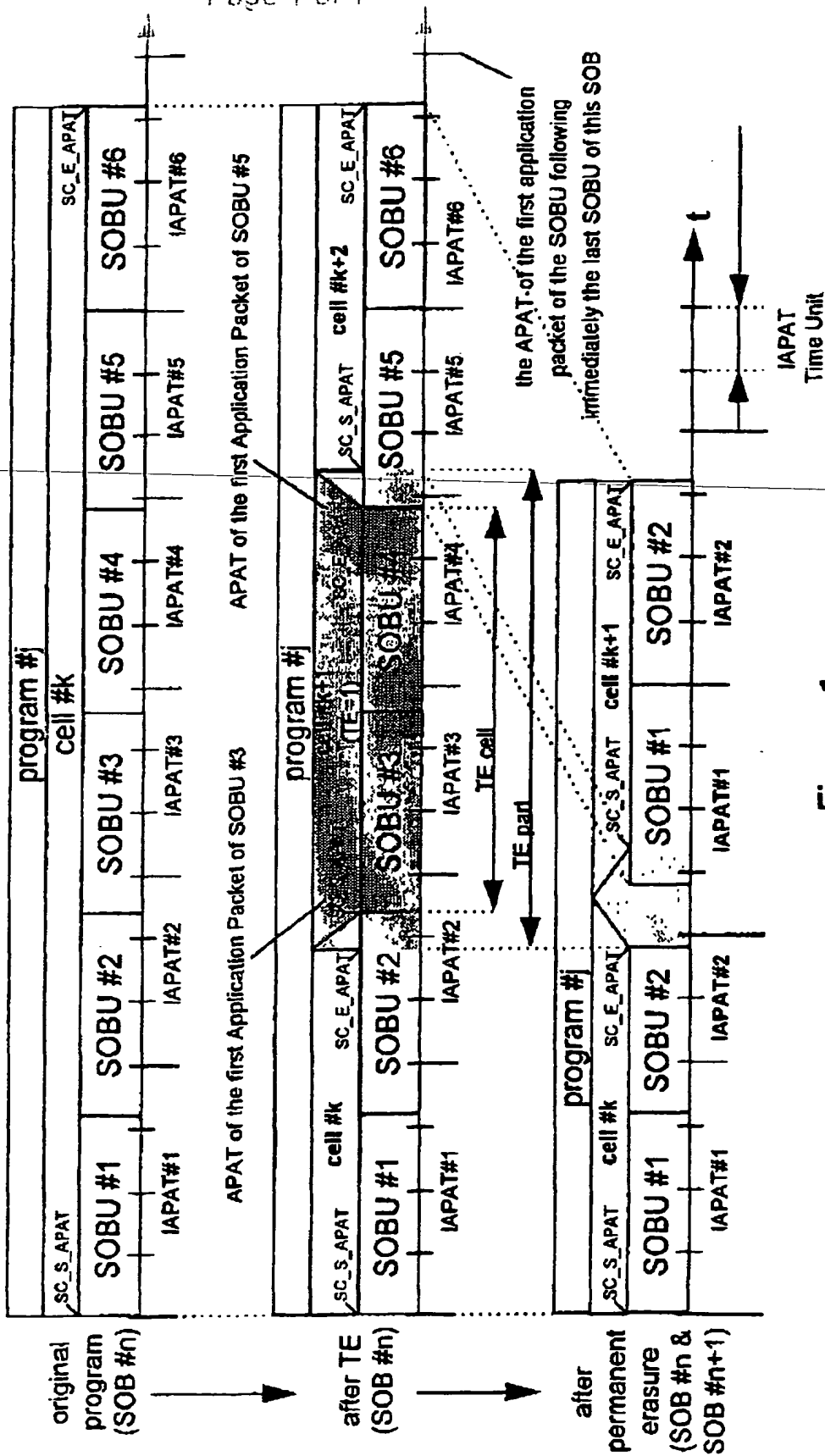


Figure 1

10

Abstract

According to the invention a method is proposed introducing a temporarily erased flag in order to indicate a cell to be temporarily erased. In addition necessary time stamps are set for complete Stream Object Unit (SOBU) to be erasable to enable on the fly permanent erasure without any additional view into the streams or quick permanent erasure. Advantageously the temporarily erasure can be withdrawn completely also.

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